

**StorageTek Linear Tape File System, Library
Edition**

Planning and Installation Guide

Release 1.0

E40555-10

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Preface

This document describes planning for installation of Oracle's StorageTek Linear Tape File System, Library Edition (LTFS-LE), followed by installation procedures for the Linux platform and the LTFS-LE installation.

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Introduction

Oracle's StorageTek Linear Tape File System (LTFS) software improves file access and portability of data on StorageTek T10000 tape or Linear Tape-Open (LTO) technology. LTFS software enables applications to write and retrieve files directly from tape through standard file format interfaces: CIFS or POSIX. Files may also be accessed with ease through a browser or operating system graphical interface. Users can drag and drop files to and from any storage medium: disk, tape, or flash.

Oracle offers two LTFS software solutions. The StorageTek Linear Tape File System, Open Edition (LTFS-OE) software supports a standalone or rack-mountable tape drive and provides users access to all of the files on a cartridge that is mounted to the drive. The StorageTek Linear Tape File System, Library Edition (LTFS-LE) 1.0.4.03 and earlier software supports Oracle's StorageTek SL3000, SL8500, and SL150 tape libraries, managing multiple tape drives and media. (LTFS-LE1.0.4.03 and earlier software versions support Oracle's StorageTek SL3000, SL8500, and SL150 tape libraries. LTFS-LE 1.0.4.04 and later versions only support SL150 tape libraries.) When a user selects a file, the system's robotics automatically mounts the corresponding tape and the file is made available to that application.

Underlying Technology

To present a complete file to a user, there are two types of data that need to be stored. First, the file metadata that contains the file structure, file names, file format, and other data elements that are indexed to simplify access to the data on the tape. Second, the file data is the raw file content that is stored on the tape.

A tape that is LTFS-formatted is designed so that it may be split into two partitions. The smaller of the two partitions, at the beginning of the tape, holds all of the file metadata for all of the files on the tape. In the metadata partition, files are stored in a hierarchical directory structure. The rest of the tape, the second partition, is dedicated to data storage, as tape storage has done for decades. Because LTFS is an open format, anyone with a compatible tape drive and the drivers to operate it can read an LTFS tape without an archive application or assistance from any other software. When a piece of tape media is loaded into a tape drive the complete file folder image is displayed, with the file structure being pulled from the first partition and the raw file content being accessed from the second partition. After the metadata from a tape is read, the LTFS-LE software stores a copy of that metadata on the server for faster file access in the future.

Pre-Installation Planning

This chapter contains the following topics:

- ["Hardware Requirements"](#) on page 2-1
- ["Software Requirements"](#) on page 2-2
- ["Browser Requirements"](#) on page 2-3
- ["Co-Hosting with ACSLS"](#) on page 2-3
- ["What's not Supported in this Release"](#) on page 2-4
- ["LTFS-LE Planning Checklist"](#) on page 2-4

Hardware Requirements

LTFS-LE supports the following servers, libraries, and tape drives.

Servers

- LTFS-LE
 - The minimum server requirements include:
 - The LTFS-LE server should have a minimum of 32 GB of memory for every two tape drives that will be used by LTFS-LE.
 - Back End 8 GB FC Ports minimum: 1
 - Front End 1 GB Ethernet Ports minimum: 1
 - Server Disk Capacity: 1TB
 - Server on which LTFS-LE is installed must have a static IP address.
 - Dynamic (DHCP) is not supported.
 - LTFS-LE must be the only application running on the LTFS-LE server.
- ACSLS server with ACSLS 8.4 with the latest patch installed and configured. See ["Installing ACSLS 8.4"](#) on page 4-4.

Note: You must install ACSLS 8.4 to support the LTO-7 tape drive.

Libraries

LTFS-LE supports the following libraries:

- LTFS-LE 1.0.3 and earlier

- StorageTek SL3000 FRS 4.0 or higher. SL3000 AEM has not been tested nor is it supported.
- StorageTek SL8500 FRS 8.07 or higher
- StorageTek SL150 FRS 2.01 or higher
- LTFS-LE 1.0.4 and later
 - StorageTek SL150 FRS 2.01 or higher

Partitioning

If the library is not partitioned, all of the library resources will be dedicated only to LTFS-LE. If you want to share library resources (such as CAPs, tape drives, volumes, slots) with other applications, you must partition the library. When partitioning the library, the partition that you create for LTFS-LE must be dedicated to the LTFS-LE application. Except for the CAP, the resources for the LTFS-LE partition cannot be shared. When creating a library partition for LTFS-LE, the partition must meet the following requirements:

- The partition must use the HLI interface.
- The partition must contain at least one drive.
- The partition must contain at least one storage slot.
- The partition must contain an HLI CAP (the CAP can be shared with other HLI partitions).

Tape Drives

LTFS-LE supports LTO 5, LTO 6, LTO 7, T10000C, and T10000D tape drives. However, LTFS-LE does not support a mixture of T10000C and T10000D tape drives within an LTFS-LE partition (or library if it is not partitioned).

- LTFS-LE 1.0.3 and earlier
 - StorageTek T10000C (standard cartridge only)
 - StorageTek T10000D (standard cartridge only)
 - HP-LTO 5 Full-Height
 - HP-LTO 6 Full-Height
 - IBM-LTO 7 Full-Height
- LTFS-LE 1.0.4 and later
 - HP-LTO 5 Half-Height
 - IBM-LTO 6 Half-Height
 - IBM-LTO 7 Half-Height

Software Requirements

- Oracle Linux Server Edition Release 6 Update 5 Media Pack for x86_64-bit.
Other operating systems, including higher versions of Linux are not tested or supported.

The prerequisite software is bundled with LTFS-LE 1.0: Oracle Advanced Development Framework 12.2.1 (ADF); WebLogic 12.2.1; Java 1.8.0_92; and MySQL 5.7.14.

- Oracle LTFS-OE 1.2.7 with 2.2 format.
- During operating system (O/S) configuration, the swap space should be configured to be at least twice the size of the physical memory of the system.

Browser Requirements

LTFS-LE 1.0 has been tested and verified on the following browsers:

- Internet Explorer 8
- Firefox 17

Co-Hosting with ACSLS

Note: Only the SL150 has been tested in a co-hosted environment.

Note: The ACSLS server needs a fibre-channel Host-Bus Adapter (HBA) that is compatible with the bridged drive in the SL150 library. Serial Attached SCSI (SAS) bridged drives for control path are not supported.

The pre-requisites for co-hosting LTFS-LE 1.0.4 software with ACSLS 8.4 software are:

1. Install and configure LTFS-LE 1.0.4 as described in this guide.
2. Before you install ACSLS 8.4, create `/export`, `/export/home`, and `/export/backup` directories on the LTFS-LE server.
3. Connect the SL150 library and drives to the LTFS-LE server and ensure they are seen by the operating system (OS).

Example Output:

```
# lsscsi
[7:0:0:0]   tape    HP          Ultrium 6-SCSI  239S  /dev/st0
[8:0:0:0]   tape    HP          Ultrium 6-SCSI  239S  /dev/st1
[9:0:0:1]   mediumx STK        SL150          0225  /dev/sch0
```

4. Install and configure ACSLS 8.4 with the latest patch.
 - a. Install the mchanger driver for the fibre-attached libraries.

Example Output:

```
Successfully built the following...
/dev/mchanger-3500104f000cce898: STK SL150 V-0225 30-cells 2-drives
```

In this example, you use the driver (`/dev/mchanger-3500104f000cce898`) for the connection when configuring ACSLS to the library

- b. Do not install the graphical user interface (GUI).
- c. Install the optional `lib_cmd` interface.

When you co-host LTFS-LE and ACSLS, the ACSLS instance must be exclusively dedicated to LTFS-LE.

What's not Supported in this Release

- Network File System (NFS)
- Apple Mac clients
- Creating shortcuts to files stored in the LTFSLE volumes directory

LTFS-LE Planning Checklist

During installation, you are asked for the following information.

LTFS-LE Server

- Name
- IP
- Subnet Mask
- Default gateway
- DNS server
- Alternate DNS server
- Domain name
- Search domains

ACSLs Server

Note: When co-hosting with ACSLS, do not install the ACSLS graphical user interface.

- Name
- IP
- ACS
- CAP Priority must be set to a nonzero value for any partition used by the LTFS-LE software.
- If you are using the SL8500 library, the float option must be disabled (turned-off).
For the procedure to disable float, refer to "Using the Extended Store Feature" in the *StorageTek Automated Cartridge System Library Software 8.4 Administrator's Guide*.

Configure ACSLS to manage the SL3000 or SL8500 partition for use by the LTFS-LE software.

Refer to the *StorageTek Automated Cartridge System Library Software 8.4 Administrator's Guide* for more information.

Library (SL3000)

The SL3000 is supported only on LTFS-LE 1.0.3 and earlier.

- Name
- IP
- Partition: **HLI**

Note: When adding a partition, be sure to select **HLI** for Interface Type.

Using the SLConsole, make sure the partition has drive bays, storage cells, and an HLI cap.

Refer to the *StorageTek SL3000 Modular Library System User's Guide* for more information.

- Storage cells
- Drive bays
- CAP
- Drives
- Media

Library (SL8500)

The SL8500 is supported only on LTFS-LE 1.0.3 and earlier.

- Name
- IP
- Storage cells
- Drive bays
- CAP
- Drives
- Media

Library (SL150)

The SL150 is supported on all versions of LTFS-LE 1.0.

Note: In the SL150 configuration settings, ensure that the "Library Volume Label Format" setting is set to "Trim last 2 characters" (default). Refer to the *StorageTek SL150 Tape Modular Library User's Guide* for more information.

- Name
- IP
- Partition

Note: ACSLS does not support partitioned SL150s. Although ACSLS does not prevent partitioning an SL150, if you do partition it and try to configure it to ACSLS things may not work.

For more information, refer to ACSLS Support of the SL150 in the *StorageTek Automated Cartridge System Library Software Administrator's Guide*.

- Storage cells
- Drive bays
- CAP
- Drives
- Media

Fibre Channel San Switch

- Name
- IP
- Zone Name

If using a fibre channel switch to connect your LTFS-LE server to drives, refer to manufacturer's documentation for setting up a zone for your configuration.

- Ports

Installing Linux

This chapter describes the installation process for installing Linux and the prerequisite software. This includes the following tasks:

- "Downloading Oracle Linux" on page 3-1
- "Linux Installation Tasks" on page 3-2
- "Linux Post-Installation Tasks" on page 3-6

You can install Oracle Linux from DVD media, from a jump-start server, or from an ISO image that resides on a remote server. Most contemporary Oracle Sun X86 servers are equipped with an advanced service processor using Integrated Lights Out Manager (ILOM). The ILOM enables you to install the Linux operating system on the same system using remotely mounted media. Consult your Sun server documentation for details on how to use the Oracle ILOM.

Downloading Oracle Linux

Use the following procedure to download the Linux installer media pack from the Oracle Software Delivery Cloud website. The media pack is delivered as a zip file, which you can extract and write to portable media of your choice.

1. Start a web browser on the system and navigate to the Oracle Software Delivery Cloud website at the following URL.
<https://edelivery.oracle.com>
2. Click **Sign In**.
3. Enter the username and password provided by your Oracle support representative.
4. Click **Accept** on the Export Restrictions screen.
5. Next to the Filter Products By, uncheck the Programs box and check the **Linux/OVM/VMs** box. Enter **oracle linux** in the Product box and select Oracle Linux in the Product drop down menu.
6. Click the Select Platform drop-down menu and check the **x86 64 bit** box. Click **Select**.
7. Verify your selection in the Selected Products screen and click **Continue**.
8. Under Available Releases, click **Select Alternate Release**.
9. In the Available Release drop-down menu, select **Oracle Linux 6.5.0.0.0 for x86 64 bit**. Click **Continue**

10. In the Oracle Standard Terms and Restrictions window, review and accept the terms of the licenses. Click **Continue**.
11. In the File Download window, select and save **V41362-01.iso Oracle Linux Release 6 Update 5 for x86_64 (64 Bit)** to the location of your choice.
The file size should be 3.6 GB.
12. Use the media writing software of your choice to write the ISO image files to the media of your choice.
13. Proceed to "[Linux Installation Tasks](#)" on page 3-2.

Linux Installation Tasks

- "[Installing Linux](#)" on page 3-2
- "[Verifying Your Linux Release](#)" on page 3-5

Installing Linux

1. Attach the media you created in "[Downloading Oracle Linux](#)" on page 3-1.
2. Initiate the Linux installer by following the instructions in the README file on the media.
3. Select **Install or upgrade an existing system**.
A series of messages appear as the installer probes your system.
4. If you are installing from DVD/CD-ROM, the CD Found screen appears. You can perform a test of the DVD/CD-ROM media, but this is not required and can be time-consuming. To skip the media test, perform the following steps.
 - a. Click **Tab** to highlight the **Skip** option.
 - b. Click **Enter**.
An information screen appears as the installer starts. This process may take a minute or two.
5. On the Oracle Linux 6 Welcome screen, click **Next**.
6. Select your language on the Language Selection screen and click **Next**.
7. Select the relevant keyboard language, then click **Next**.
8. Select **Basic Storage Devices**, then click **Next**.
9. Select **Fresh Installation**.
10. Enter *hostname.domainname* for the server, then click **Configure Network**.
11. Perform the following steps on the Network Connection screens to set up the network on your server:
 - a. Select **Network Connection: (eth0)** and click **Edit**.
 - b. Check the **Connect automatically** check box.
 - c. Click **IPv4 Settings**.
 - d. Select **Manual Method** and click **Add**.
 - e. Enter the LTFSL server IP address.
 - f. Enter the Netmask (example: 255.255.255.0).

- g. Enter the *gateway ip address*.
 - h. Enter DNS Servers separated by commas.
 - i. Enter search domains separated by commas.
 - j. Click **Apply**, **Close**, and **Next**.
12. On the time zone screen, select the LTFS-LE server's time zone.
 13. On the password screen, enter and confirm your chosen `root` password for the server, then click **Next**.
 14. Select **Use All Space** and check the **Review and modify partitioning layout** check box. Click **Next**.
 15. Select your boot disk drive and move the device to Install Target Devices.
Make sure the disk also has the boot loader option selected under the Install Target Devices and click **Next**.

Note: Due to the limitations of Oracle OUI Gen1, ensure that the disk volume is no larger than 2 TB.

16. Adjust the amount of space given to `lv_home` and `lv_root`.

By default more space is given to `lv_home`. Because LTFS-LE uses `lv_root`, it is advisable that you shrink the `lv_home` partition and increase the `lv_root` partition. A 50/50 ratio between `lv_root` and `lv_home` should be sufficient.

Note: The swap space should be configured to be at least twice the size of the physical memory of the system.

At the LVM Volume Group screen, you can modify the following system `lv` volume group partitions:

```
lv_root
lv_home
lv_swap
```

Now create a partition that should be located on a separate disk.

By default, all partitions are set to the `ext4` file system type. The global namespace component for LTFS-LE must reside on an `ext3` file system type. You must dedicate one disk (or disk volume) for the LTFS-LE global namespace component. To do this:

- a. Select the disk that you want to partition (example: `sdb`) for the global namespace `/mnt/LTFS_LE`.

Make sure the disk is free. If it previously contained data or was partitioned, delete the partition (and data).

- b. Click **Create**.
- c. Select **Standard Partition** button.
- d. Enter this mount point.

```
/mnt/LTFS_LE
```

- e. Select `ext3` from the File System Type drop down box.

- f. In the Allowable Drives box, only select the drive to be used for the global namespace mountpoint (`/mnt/LTFS_LE`).
- g. Click **Fill to Maximum Size** check box.
- h. Click **OK**.

Note: For Systems Containing One Disk (or Disk Volume): If you only have one disk (or disk volume) in the system, it is still advisable to adjust the amount of space give to `lv_home` and `lv_root` as described above. However, in a one disk environment, the `lv_root` partition must also be formatted as `ext3`. To do this:

1. Select `lv_root` partition.
2. Click **Edit**.
3. Select `ext3` from the File System Type drop down box.

Due to the limitations of Oracle OUI Gen1, ensure that the disk volume is no larger than 2 TB.

4. Click **OK**.
-
-

17. Click **Next**.
18. On the Writing Storage configuration to disk screen, click **Write Changes to disk**. The file systems are created.
19. On the Grub boot loader screen, click **Next** to accept the defaults.
20. In the software selection screen, select **Basic Server**, but do not change the repository options. Select **Customize Now** and click **Next**.
21. In the left panel, select **Base System**.
If a box is already checked, do not uncheck it.
22. In the left panel, select **Servers**. In the right panel:
 - a. Check the **Server Platform** and **Directory Server** check boxes.
 - b. Click **Optional Packages**.
 - c. Under the Packages in Directory Server dialog box, select the **samba-3.6.9-164.el6.x86_64-Server and Client software to interoperate with Windows machines** check box.
 - d. Click **Close**.
23. In the left panel, select **Desktops**. In the right panel:
 - a. To support local or remote graphics monitors, ensure the following boxes are checked:
 - Desktop
 - Desktop Platform
 - General Purpose Desktop
 - Graphical Administration Tools
 - X Window System
 - b. Leave all other check boxes as is.
24. In the left panel, select **Applications**. In the right panel:

- a. Select **Internet Browser**.
- b. Click **Next**.

The system performs a dependency check, then starts the installation process.

25. When the Congratulations screen appears, remove the installation media, then click **Reboot**.
26. On the Welcome screen, click **Forward**.
27. Accept the license agreement and click **Forward**.
28. On the Set Up Software Updates screen, select whether to register now or wait for a later time. Click **Forward**.
29. Finish the software updates by clicking **Forward**.
30. On the Create User screen, click **Forward**.
31. Click **Yes** when asked if you are sure you want to continue?
32. On the Date and Time screen:
 - a. Optionally, click the **Synchronize date and time over the network** check box to configure your system to use Network Time Protocol (NTP) servers to maintain the accuracy of the clock. This displays the list of default NTP servers.
 - b. Click **Add** to add your NTP server IP address(es) in the NTP Servers box. Delete the default NTP Servers IP address(es) that you do not need.
 - c. Click **Forward**.
33. On the Kdump screen, check the Enable kdump? check box.
 - a. Leave the default settings and click **Finish**.
 - b. Click **Yes** when asked want to continue with this change and reboot the system after the first boot is complete.
 - c. Click **OK** on the popup window, "The system must now reboot for some of your selections to take effect".
34. Proceed to ["Verifying Your Linux Release"](#) on page 3-5.

Verifying Your Linux Release

Use this procedure to confirm the release and update level of Linux installed on the LTFS-LE server.

1. Verify your Linux release is Red Hat Enterprise Linux Server release 6.5 (Santiago):


```
# cat /etc/redhat-release
```
2. Verify the kernel is at 3.8.13-16.xx.x.el6uek.x86_64, where xx.x is 2.1 or higher: The critical digits must be 3.8.13-16.


```
# uname -a
```
3. Make sure the drives you have configured and zoned (attached to your LTFS-LE server) are configured by the operating system:


```
# cat /proc/scsi/scsi | egrep -i "stk|ibm|hp"
```

Below is a sample output of an LTFSLE server attached to one Oracle T10KC, one HP LTO5, and one IBM LTO5 tape drive:

```
Host: scsi7 Channel: 00 Id: 02 Lun: 00
  Vendor: STK      Model: T10000C      Rev: 1.57
  Type:   Sequential-Access      ANSI SCSI revision: 05
Host: scsi7 Channel: 00 Id: 03 Lun: 00
  Vendor: HP       Model: Ultrium 5-SCSI Rev: I59S
  Type:   Sequential-Access      ANSI SCSI revision: 05
Host: scsi7 Channel: 00 Id: 03 Lun: 00
  Vendor: HP       Model: Ultrium 5-SCSI Rev: I59S
  Type:   Sequential-Access      ANSI SCSI revision: 06
Host: scsi7 Channel: 00 Id: 00 Lun: 00
  Vendor: IBM      Model: ULTRIUM-TD5    Rev: CBX0
  Type:   Sequential-Access
```

4. Backup the `/etc/hosts` file, then edit the file and add a line with the LTFS-LE server IP address, the fully qualified hostname and domain name, and the hostname.

In this example, `10.0.0.1` is the IP address, `ltfsleServer.us.mycorp.com` is the hostname and domain name, and `ltfsleServer` is the hostname.

```
10.0.0.1 ltfsleServer.us.mycorp.com ltfsleServer
```

5. Verify your `/etc/hosts` file:

```
# cat /etc/hosts
```

You should see output similar to the following example of an `/etc/hosts` file from an LTFS-LE server called `ltfsleServer`:

```
# Do not remove the following line, or various programs
# that require network functionality will fail.
172.16.0.0 localhost.localdomain localhost
::1      localhost6.localdomain6 localhost6
10.0.0.1 ltfsleServer.us.mycorp.com ltfsleServer
```

Linux Post-Installation Tasks

- ["Installing LTFS-LE Prerequisites"](#) on page 3-6
- ["Installing 2.6.32-431.20.5 kernel"](#) on page 3-7
- ["Updating Hardware and Firmware"](#) on page 3-9
- ["Creating the Oracle User and oinstall Group"](#) on page 3-9
- ["Disabling the Oracle Enterprise Linux 6.5 Firewall"](#) on page 3-9
- ["Disabling SELinux"](#) on page 3-9
- ["Updating Kernel Parameters"](#) on page 3-10
- ["Downloading LTFS-LE Software"](#) on page 3-10
- ["Running coreSysPrep.sh"](#) on page 3-11

Installing LTFS-LE Prerequisites

After Oracle Linux is installed, you will add specific packages required for LTFS-LE from the Oracle Yum repository. If your LTFS-LE server is behind a firewall, you may need to configure your LTFS-LE Oracle Linux system to use a local proxy server.

1. Edit `/etc/yum.conf` to update proxy and caching parameters:

```
Proxy=http://your local proxy server
```

```
http_caching=packages
```

2. Configure yum to use the Oracle Linux repository for the correct architecture.

Edit the file, `/etc/yum.repos.d/public-yum-ol6.repo`, to include `i686` and additional Debuginfo packages. Add the following lines to the bottom of this file.

```
[ol6_latest_i386]
name=Oracle Linux 6 Latest 32-bit (i386)
baseurl=http://public-yum.oracle.com/repo/OracleLinux/OL6/latest/i386/
gpgkey=http://public-yum.oracle.com/RPM-GPG-KEY-oracle-ol6
gpgcheck=1
enabled=1
```

```
[ol6_OSS_Debuginfo]
name=Oracle Linux 6 OSS Debuginfo
baseurl=https://oss.oracle.com/ol6/debuginfo/
gpgkey=https://oss.oracle.com/ol6/RPM-GPG-KEY-oracle
gpgcheck=1
enabled=1
```

3. Disable the yum packagekit refresh.
 - a. Edit the file, `/etc/yum/pluginconf.d/refresh-packagekit.conf`.
 - b. Set `enabled=0`.
4. Install the pre-requisite packages for LTFS-LE.

```
yum install binutils elfutils-libelf elfutils-libelf.i686 elfutils-libelf-devel
yum install libgcc libgcc.i686 libstdc++ libstdc++.i686 libstdc++-devel
yum install gcc gcc-c++ glibc glibc.i686 glibc-devel glibc-devel.i686 libgomp
yum install libicu-devel icu libaio libaio.i686 libaio-devel
yum install compat-libcap1 compat-libstdc++-33 compat-libstdc++-33.i686
yum install libXext libXext.i686 libXtst libXtst.i686 libXi libXi.i686
yum install libXp libXp.i686 libxml2 libxml2.i686 openmotif openmotif22
yum install fuse fuse-libs fuse-devel sg3_utils sg3_utils-libs sg3_utils-devel
yum install lsscsi mt-st mtx redhat-lsb make sysstat rpm-build
yum install bash perl perl-XML-Parser perl-XML-Simple
```

Installing 2.6.32-431.20.5 kernel

1. Install the 2.6.32-431.20.5 kernel packages for LTFS-LE.

```
yum install kernel-2.6.32-431.20.5.el6 kernel-firmware-2.6.32-431.20.5.el6
kernel-headers-2.6.32-431.20.5.el6
```

```
yum install kernel-debug-2.6.32-431.20.5.el6
kernel-debug-devel-2.6.32-431.20.5.el6
```

```
yum install kernel-debuginfo-common-x86_64-2.6.32-431.20.5.el6
kernel-debuginfo-2.6.32-431.20.5.el6
```

```
yum install kernel-devel-2.6.32-431.20.5.el6
kernel-debug-debuginfo-2.6.32-431.20.5.el6
```

2. Edit the file, `/etc/grub.conf`, to boot the 2.6.32-431.20.5 kernel by default on system boot.

Example: Below is a sample `/etc/grub.conf` after installing the `kernel-2.6.32-431.20.5` rpms.

```
# grub.conf generated by anaconda
#
# Note that you do not have to rerun grub after making changes to this file
# NOTICE: You have a /boot partition. This means that
#   all kernel and initrd paths are relative to /boot/, eg.
#   root (hd0,0)
#   kernel /vmlinuz-version ro root=/dev/mapper/vg_ltfsleserver-lv_root
#   initrd /initrd-[generic-]version.img
# boot=/dev/sda
default=2
timeout=5
splashimage=(hd0,0)/grub/splash.xpm.gz
hiddenmenu
title Oracle Linux Server Red Hat Compatible Kernel (2.6.32-431.20.5.el6.x86_64)
    root (hd0,0)
    kernel /vmlinuz-2.6.32-431.20.5.el6.x86_64 ro root=/dev/mapper/vg_ltfsleserver
-lv_root rd_NO_LUKS LANG=en_US.UTF-8 rd_LVM_LV=vg_ltfsleserver/lv_swap rd_NO_MD SYSPON
T=latarcyrheb-sun16 KEYBOARDTYPE=pc KEYTABLE=us rd_LVM_LV=vg_ltfsleserver/lv_root rd
_NO_DM rhgb quiet crashkernel=128M
    initrd /initramfs-2.6.32-431.20.5.el6.x86_64.img
title Oracle Linux Server Red Hat Compatible Kernel (2.6.32-431.20.5.el6.x86_64.
debug)
    root (hd0,0)
    kernel /vmlinuz-2.6.32-431.20.5.el6.x86_64.debug ro root=/dev/mapper/vg_ltfsleserver-lv_root
rd_NO_LUKS
LANG=e
n_US.UTF-8 rd_LVM_LV=vg_ltfsleserver/lv_swap rd_NO_MD SYSPON=latarcyrheb-sun16 KEYBOARDTYPE=pc
KEYTABLE=us rd_LVM_L
V=vg_ltfsleserver/lv_root rd_NO_DM rhgb quiet crashkernel=128M
    initrd /initramfs-2.6.32-431.20.5.el6.x86_64.debug.img
title Oracle Linux Server Unbreakable Enterprise Kernel (3.8.13-16.2.1.el6uek.x86_64)
    root (hd0,0)
    kernel /vmlinuz-3.8.13-16.2.1.el6uek.x86_64 ro root=/dev/mapper/vg_ltfsleserver-lv_root rd_
NO_LUKS
LANG=en_US.
UTF-8 rd_LVM_LV=vg_ltfsleserver/lv_swap rd_NO_MD SYSPON=latarcyrheb-sun16 KEYBOARDTYPE=pc
KEYTABLE=us
rd_LVM_LV=vg_
ltfsleserver/lv_root rd_NO_DM rhgb quiet crashkernel=128M
    initrd /initramfs-3.8.13-16.2.1.el6uek.x86_64.img
title Oracle Linux Server Red Hat Compatible Kernel (2.6.32-431.el6.x86_64)
    root (hd0,0)
    kernel /vmlinuz-2.6.32-431.el6.x86_64 ro root=/dev/mapper/vg_ltfsleserver-lv_root rd_NO_LUKS
LANG=en_US.UTF-8
rd_LVM_LV=vg_ltfsleserver/lv_swap rd_NO_MD SYSPON=latarcyrheb-sun16 crashkernel=auto
KEYBOARDTYPE=pc
KEYTABLE=us rd_
LVM_LV=vg_ltfsleserver/lv_root rd_NO_DM rhgb quiet
    initrd /initramfs-2.6.32-431.el6.x86_64.img
```

In the sample above:

- See the line `default=2`.
This is the numeric value (starting at 0) of the default kernel that will boot. The numeric value is determined by the order in which the kernels are listed in this file.
- The list of Linux kernels installed on the system are below the `hiddenmenu` line. Each one starts with `title Oracle Linux Server`. In this sample file:

- title Oracle Linux Server Red Hat Compatible Kernel (2.6.32-431.20.5.el6.x86_64) is the first one in the list.

The default is 0. This is the kernel we want to boot. To do this, we would need to change the default to 0. In this sample we would change 2 to 0.

Change `default=2` to `default=0`.

Make the appropriate changes on your system to boot the 2.6.32-431.20.5 kernel, depending on the numeric value of where the kernel is listed in your `/etc/grub.conf` file.

Save the file.

- title Oracle Linux Server Red Hat Compatible Kernel (2.6.32-431.20.5.el6.x86_64.debug) is the next kernel in the list.

The default is 1. We do not want to boot this kernel because it is a debug kernel.

- title Oracle Linux Server Unbreakable Enterprise Kernel (3.8.13-16.2.1.el6uek.x86_64) is the third kernel in the list.

The default is 2. This is the kernel that is installed and set as the default during an initial installation of OEL 6.5, thus the current default setting in this sample `/etc/grub.conf` file is set to 2.

- title Oracle Linux Server Unbreakable Enterprise Kernel (3.6.32-431.el6uek.x86_64) is the fourth kernel in the list.

The default is 3. This is an older 2.6.32-431 kernel so we do not want to boot it.

Updating Hardware and Firmware

To ensure hardware devices that used by LTFs-LE are working properly, visit the device manufacturer's website for updates to drivers and/or firmware for the devices that are installed on your system.

This would include hardware, such as HBAs, tape drives, libraries, and NIC cards.

Creating the Oracle User and oinstall Group

Create the oracle user and add it to the oinstall group for WebLogic and ADF installation.

```
# /usr/sbin/groupadd --gid 501 oinstall
# /usr/sbin/useradd -u 500 -g oinstall oracle
# passwd oracle
```

Disabling the Oracle Enterprise Linux 6.5 Firewall

```
# service iptables save
# service iptables stop
# chkconfig iptables off
# chkconfig --list iptables
```

Disabling SELinux

1. Edit `/etc/selinux/config`.
2. Find the line:

```
SELINUX=enforcing
```

3. Change the line to:

```
SELINUX=disabled
```

Updating Kernel Parameters

Update the kernel parameters by editing `limits.conf`.

The file is located under `/etc/security`.

1. As root, make a copy of the `limits.conf` file.

```
cp limits.conf limits.conf.ORIG
```

2. Edit `limits.conf` by adding the following (including the # comments) for the oracle and root users:

```
#####Adding for Oracle Fusion Middleware Requirements#####
oracle soft nproc 2047
oracle hard nproc 16384
oracle soft nofile 4096
oracle hard nofile 65536
oracle soft stack 10240
oracle hard stack 32768
root soft nproc 2047
root hard nproc 16384
root soft nofile 4096
root hard nofile 65536
root soft stack 10240
root hard stack 32768
# Enable core files for all users
* soft core unlimited
```

3. Reboot the server.

```
# reboot -n
```

4. After the reboot, check to ensure that the correct kernel was booted. For example:

```
#uname -a
```

```
Linux servername.hostname.domainname.com 2.6.32-431.20.5.el6.x86_64 #1
SMP Wed Jul 23 10:25:58 PDT 2014 x86_64 x86_64 x86_64 GNU/Linux
```

5. If this is not correct, review and edit the `/etc/grub.conf` file and make sure you have the right numeric value for the default kernel you want to boot. Reboot the system, and check again, until the desired kernel is booted.

Downloading LTFS-LE Software

1. As **root**, create a `/downloads` directory.
2. Start a web browser on the system and navigate to the Oracle Software Delivery Cloud website at the following URL.

<https://edelivery.oracle.com>

3. Click **Sign In**.
4. Enter the username and password provided by your Oracle support representative.

5. Click **Accept** in the Export Restrictions window.
6. Enter **ltfs** for the Product and select **StorageTek Linear Tape File System, Library Edition**.
7. Click Select Platform and check the Linux x86-64 box. Click **Select**.
8. Verify your selection in the Selected Products window and click **Continue**.
9. For Available Releases, verify your selection and click **Continue**.
10. In the Oracle Standard Terms and Restrictions window, review and accept the terms of the licenses. Click **Continue**.
11. In the File Download window, click the zip file containing the Oracle StorageTek Linear Tape File System (LTFS), Library Edition software and save it to the `/downloads` directory.

Running `coreSysPrep.sh`

1. Unzip the file you just downloaded.
2. Extract the tar file.

```
# tar -xvf LTFSLE_x.xxx.tar
```
3. Run `coreSysPrep.sh`.

```
# ./coreSysPrep.sh
```
4. You are now ready to install the LTFS-LE package.

Installing LTFS-LE

This chapter describes the procedures for installing LTFS-LE. The tasks include:

- ["Before Installing LTFS-LE"](#) on page 4-1.
- ["Installing LTFS-LE"](#) on page 4-1.
- ["Installing LTFS Open Edition"](#) on page 4-3
- ["Installing IBM lin_tape and lin_taped Driver Software"](#) on page 4-3
- ["Importing LTFS-LE Groups"](#) on page 4-3.
- ["Installing ACSLS 8.4"](#) on page 4-4
- ["Verifying Library Configuration and Settings"](#) on page 4-5.
- ["Verifying Drive Connections"](#) on page 4-6.
- ["Connecting to the LTFS Library Edition BUI to Configure LTFS-LE"](#) on page 4-6.
- ["Uninstalling LTFS-LE"](#) on page 4-7.

Before Installing LTFS-LE

You need an Integrated Lights Out Manager (ILOM) or Virtual Network Computing (VNC) client to run on the system on which you're running the install. If the server is an Oracle server, an ILOM is already available.

Installing LTFS-LE

The LTFS-LE installer must be run from a graphical user interface. You can use the monitor directly attached to the system, ILOM or VNC

1. Log in to the Oracle Linux Desktop environment as Oracle user.
2. Start a terminal session.
3. Change to the directory where you untarred LTFSLE. For example:

```
cd /downloads
```

4. Run installLTFSLE.sh.

```
./installLTFSLE.sh
```

The `installLtfslE.sh` script checks ensure that all the LTFSLE pre-requisite software has been installed on the system.

If any prerequisite software is missing, the script notifies you of the missing software and then exits. If all of the prerequisite software is installed, the Oracle Universal Installer (OUI) screen displays.

5. Click **Next** on the Specify Source Location screen.

The source location is automatically set to:

```
/downloads/Disk1/stage/products.xml
```

6. Click **Next** on the Specify Home Details screen. If a message tells you the directory already exists, click **Yes** to continue. The home details are automatically set to:

Name: LTFS_LE

Path: /var/opt/Oracle/LTFS_LE

7. Click **Next** on the Welcome to Linear Tape File System Library Edition screen.

The Summary screen shows the components that will be installed.

8. Click **Install**.

The Oracle OUI installs the components needed for LTFSLE.

9. Click **Exit** on the End of Installation screen.

10. Click **Yes** at the confirmation message asking if you really want to exit.

11. In the terminal window in which the LTFS-LE installation was initiated, you are asked to assign a WebLogic Administration Username (example: `ltfsleadadmin`) and Password. This username is used to administer LTFSLE.

- Username

The Username must be at least 8 characters, and not more than 20 and must only contain alphanumeric values (a-z, A-Z, 0-9). It cannot contain any spaces or special characters.

- Password

The password must be at least eight characters, and not more than 20. It cannot contain any spaces.

During installation only, the password must only contain alphanumeric values (a-z, A-Z, 0-9). It cannot contain special characters.

After installation, from the WebLogic Administration Console, you can change the WebLogic Password to include special characters.

Be sure to keep your WebLogic Administrator Username and Password in a safe location.

This LTFS-LE WebLogic Domain is then unpacked and WebLogic started in order to configure the domain and startup settings.

Note: This process may take up to 30 minutes to complete.

Once you see the following message in the terminal window, you are ready to reboot the system:

```
.....WEBLOGIC RUNNING!
```

```
*You must now reboot the system in order to start using LTFSLE*.
```

12. Change to root and reboot.

```
su - root
reboot
```

Note: If an error occurs, review the installation logs. For example:

```
/home/oracle/oraInventory/logs/installActions2015-02-17_
07-01-15PM.log
```

where 2015-02-17_07-01-15PM is your date and time.

```
/var/opt/Oracle/LTFS_LE/cfgtoollogs/oui/installActions2015-02-17_
07-01-15PM.log
```

where 2015-02-17_07-01-15PM is your date and time.

Installing LTFS Open Edition

1. From your web browser, go to:
<https://oss.oracle.com/projects/ltfs/>
2. Click **Docs** at the top of the screen and then **LTFS 1.2.7 documents**.
(You can click **INSTALL.linux** to download the LTFS-OE installation instructions.)
3. Click **Downloads** at the top of the screen, and **OELS_rpms**.
4. Click **LTFS 1.2.7** and select **ltfs-1.2.7-20151020_orcl_oels_6_5.x86_64.rpm**.

Installing IBM lin_tape and lin_taped Driver Software

If you are using IBM LTO drives:

1. Go to the IBM Fix Central website.
2. Download the latest version of lin_tape and lin_taped driver software recommended by IBM for LTFS implementations for your operating system.

Importing LTFS-LE Groups

In order to login to the LTFS-LE BUI, the LTFS-LE user groups must be added to the WebLogic instance. Once this is done, the LTFS-LE admin user you created during the installation must be assigned to the LTFSLE Admin Group. To do this, you must:

- Import the LTFS-LE User Groups
- Add the LTFS-LE Admin Role to the Admin User

Importing the LTFS-LE User Groups

1. Go to the WebLogic Administrative Console.

```
http://servername.domain.com:7001/console
```

In the above URL, *servername* is the name of your server and *domain* is the name of your network domain.

2. Log in with the WebLogic Administrator Username (example: `ltfsleadmin`) and Password that you created during installation. See ["Installing LTFS-LE"](#) on page 4-1.
3. From the Home Page, click **Security Realms**.
4. Click on **myrealm** under the Summary of Security Realms page.
5. Select the **Providers** tab under the Settings for myrealm page.
6. Select the **Authentication** tab if you are not already on the Authentication page.
7. Click on the DefaultAuthenticator link.
8. Click the **Migration** tab under the Settings for DefaultAuthenticator page.
9. Click the **Import** tab if you are not already on the Import page.
10. Enter the following path for Import file on Server:

```
/var/opt/Oracle/Middleware/user_projects/domains/ltfsle_domain/LTFSLEGroups.dat
```
11. Click **Save**.

The LTFSLE user groups are imported into the WebLogic Security Realm, **myrealm**. You'll see the following message:

```
Settings updated successfully.
```

Adding the LTFS-LE Admin Role to the Admin User

1. Go back to the myrealm page by clicking the Security Realms link under the Domain Structure navigation pane (left side of screen).
2. Click on **myrealm** under the Summary of Security Realms page.
3. From the Settings for myrealm page, click the **Users and Groups** tab.
4. Click the **Users** tab and then click the WebLogic Administrator Username (example: `ltfsleadmin`) that you created during installation. See ["Installing LTFS-LE"](#) on page 4-1.
5. From the Settings for user (example: `ltfsleadmin`) page, click the **Groups** tab.
6. Select the **LTFS-LE Admin Role** from the Available Parent Groups list and click the right arrow to move it to the Chosen list.
7. Click **Save**.

The LTFS-LE Admin Role is added to the Admin user and the following message displays:

```
Settings updated successfully.
```
8. Click **Log Out** to exit the Console.

Installing ACSLS 8.4

1. Install ACSLS 8.4 with the latest patch.

Do not install the ACSLS GUI when you co-host LTFS-LE and ACSLS. Also, in the co-hosted environment, the ACSLS instance must be exclusively dedicated to LTFS-LE.

Do not install logical libraries.

For installation procedures, refer to the *StorageTek Automated Cartridge System Library Software 8.4 Installation Guide*.

Since you have already installed the Linux 6.5 operation system, you can begin with the section, "Installing ACSLS Prerequisites" in the Linux chapter. Also refer to the section "[Co-Hosting with ACSLS](#)" on page 2-3 for information on co-hosting LTFS-LE with ACSLS.

2. Continue with Verifying Library Configuration and Settings.

Verifying Library Configuration and Settings

LTFS-LE supports a single ACS/library, either a dedicated library or a zoned library partition. Ensure that you have configured the SL150, SL3000, or SL8500 tape library with appropriate drives and media. Using the SLConsole, ensure that the library partition has drive bays, storage cells, and an HLI library CAP.

Additionally, define the following settings:

- Use the ACSLS command, `acsss_config`, option 3 to configure the following parameters:
 - Number of days to retain volumes that are identified as ABSENT or EJECTED to the database should be set to zero (0).
 - Select **TRUE** to support alphanumeric volume ranges for commands and utilities. Alphanumeric ranges include all valid `vol_ids` in ASCII collating sequence.

Note: Changes to alphanumeric volume ranges will not take effect until ACSLS is restarted

Refer to the *StorageTek Automated Cartridge System Library Software 8.4 Administrator's Guide* for more information on the `acsss_config` command.

- Set your CAP to manual mode:

```
set cap mode manual <cap_id>
```

Example Output:

```
ACSSA> set cap mode manual 1,0,6
Set: CAP 1,0,6, mode changed to manual
Set: Set completed, Success.
```

Refer to the *StorageTek Automated Cartridge System Library Software 8.4 Administrator's Guide* for more information on `set cap`.

- Set your CAP priority to a nonzero number.

```
set cap priority cap_priority cap_id
```

For example, to assign priority 5 to CAP 4,0,6:

```
set cap priority 5 4,0,6
```

Refer to the *StorageTek Automated Cartridge System Library Software 8.4 Administrator's Guide* for more information on the `set cap priority` command.

Verifying Drive Connections

To verify drive connections, perform the following steps to compare drive serial numbers in ACSLS with drive serial numbers on the LTFS-LE server.

1. Use the ACSLS `cmd_proc` command, `display drive`, to display your drive serial numbers:

```
display drive * -f type serial_num
```

Example Output:

```
ACSSA> display drive * -f type serial_num
2013-07-19 15:34:13          Display Drive
Acs  Lsm  Panel  Drive  Type      Serial_num
2    0    10     6     T1C       576001000518
2    0    10     7     HP-LTO5   HU1246T5MV
2    0    10    11     HP-LTO5   HU1246T5PW
```

2. Display the drive serial numbers on the LTFS-LE server:

```
lsscsi -g | grep -i tape
```

Example Output:

```
# lsscsi -g | grep -i tape
[7:0:0:0]   tape    HP      Ultrium 5-SCSI  I59S /dev/st0 /dev/sg5
[9:0:0:0]   tape    STK     T10000C        1.57 /dev/st1 /dev/sg6
[11:0:0:0]  tape    HP      Ultrium 5-SCSI  I59S /dev/st2 /dev/sg7
```

```
sg_inq /dev/sg# | grep "Unit serial number"
```

Example Output:

```
# sg_inq /dev/sg5 | grep "Unit serial number"
Unit serial number: HU1246T5MV
```

```
# sg_inq /dev/sg6 | grep "Unit serial number"
Unit serial number: 576001000518
```

```
# sg_inq /dev/sg7 | grep "Unit serial number"
Unit serial number: HU1246T5PW
```

3. Verify that the drive serial numbers from steps 1 and 2 match.

Refer to the *StorageTek Automated Cartridge System Library Software 8.4 Administrator's Guide* for more information on the `display drive` command.

Connecting to the LTFS Library Edition BUI to Configure LTFS-LE

To launch the LTFS Library Edition BUI and connect to your ACSLS library perform the following steps:

1. In your browser window, type:

```
http://servername.domain.com:7001/LTFS
```

2. Enter the LTFSLE BUI administrator username (example: `ltfsleadmin`) and password that you created earlier.

You are now ready to configure your LTFS-LE system.

To configure your LTFS-LE system, refer to the LTFS Library Edition BUI online help for instructions. The online help walks you through:

- Creating the LTFS-LE library and assigning it to LTFS-LE.
- Assigning drives and volumes.
- Defining LTFS-LE system settings.
- Defining additional users.

Uninstalling LTFS-LE

This procedure removes all LTFSLE components. It does not remove the prerequisite libraries you installed using `coreSysPrep.sh`.

To uninstall LTFSLE 1.0.x.xx.xxx:

1. Log in to the Oracle Linux Desktop environment as `root`.
2. Change to the downloads directory and run the uninstall script.

```
./uninstallLTFSLE.sh
```

3. The message displays to un-install all the components of LTFSLE Version 1.0.x.xx.xxx.

4. Type either **y** or **n** at the following prompt:

```
Do you want to continue with the LTFSLE Uninstall (y/n)?
```

- Type **y** if you have already backed up your data or if you do not want to re-install LTFS-LE.

You receive an *LTFSLE Uninstall Complete!* message.

- Type **n** to back up your data.

It is highly recommended that you back up your data if you plan to re-install LTFSLE 1.0.x.xx.xxx. This lets you use your backup to perform a restore without LTFS-LE having to mount all your cartridges to access your data.

Refer to the *StorageTek Linear Tape File System, Library Edition Administration Guide* for procedures on backing up and restoring your data.

Note: The installation of LTFSLE has modified the `/etc/security/limits.conf` file.

Un-installing LTFSLE will not change the file. If you want to set it back to its original state, copy `/etc/security/limits.conf.ORIG` to `/etc/security/limits.conf`.

Type **Yes** if you are prompted to overwrite the file.

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